

## **CLAIMS**

1. Process for improving the physicochemical properties of bitumen characterized by the fact that a sufficient quantity of amorphous silica ultimately made functional is added to the bitumen formulation.

2. Process for improving the physicochemical properties of the bitumen formulation including the following steps:

1-the bitumen formulation is heated to a temperature ranging from 120 to 190°C

2-a sufficient quantity of amorphous silica powder ultimately made functional is added to the bitumen formulation from step 1 under agitation.

3. Process according to claim 2, characterized by the fact that granular materials are added to the bitumen formulation under agitation and at a temperature ranging from 120 to 190°C, before, at the same time as, or after the addition of silica ultimately made functional from step 2.

4. Process for improving the physicochemical properties of the bitumen formulation including the following steps:

1 –the bitumen formulation is heated to a temperature ranging from 120 to 190°C;

2- a sufficient quantity of amorphous silica ultimately made functional is added to the bitumen formulation from step 1 under agitation;

3- an emulsion is prepared with the bitumen obtained from step 2 by mixing water, the said bitumen and an emulsifier;

4-the emulsion obtained from step 3 is spread to obtain a uniform coat of the mixture obtained from step 3;

5-the bitumen emulsion is broken down.

5. Process according to claim 4, characterized by the fact that granular materials are added under agitation and at ambient temperature to the bitumen emulsion obtained from step 3 of the process.

6. Process for improving the physicochemical properties of the bitumen formulation including the following steps:

1- a bitumen emulsion is prepared by mixing water; bitumen and an emulsifier at ambient temperature;

2- a sufficient quantity of amorphous silica ultimately made functional is incorporated into the bitumen emulsion from step 1 under agitation at ambient temperature;

3- the emulsion obtained in step 2 is spread to obtain a uniform coat of the mixture obtained in step 2;

4- the bitumen emulsion is broken down.

7. Process according to claim 6, characterized by the fact that granular materials are added under agitation and at ambient temperature to the bitumen formulation after the addition of silica ultimately made functional from step 2.

8. Process according to any of the claims 1 to 7, characterized by the fact that the quantity of amorphous silica ultimately made functional introduced into the bitumen formulation ranges between 0.01 and 20% by weight of dry powder compared to the weight of the bitumen formulation.

9. Process according to claim 8, characterized by the fact that the quantity of amorphous silica ultimately made functional introduced into the bitumen formulation ranges from 0.1 to 7 % by weight of dry powder compared to the weight of the bitumen formulation.

10. Process according to any of the claims 1 to 9, characterized by the fact that the amorphous silica is a synthetic silica.

11. Process according to claim 10, characterized by the fact that the synthetic silica is a precipitated silica.

12. Process according to claim 11 characterized by the fact that the precipitated silica is present in the form of essentially spherical balls, notably of an average size of at least 80 microns, for instance of at least 150 microns.

13. Process according to any of the claims 11 or 12, characterized by the fact that the silica is a highly dispersible silica.

14. Process according to any of the claims 11 to 13, characterized by the fact that the silica is a low water uptake silica.

15. Process according to any of the claims 1 to 14 characterized by the fact that the silica was treated beforehand with at least one coupling agent chosen from among the silicones, the alkylsilicones, the amino-silicones, the thiol-silicones, or the epoxy-silicones.

16. Process according to claim 15, characterized by the fact that the quantity of coupling agents introduced into the amorphous silica ranges between 0.1 and 30% by weight compared to the weight of the amorphous silica.

17. Process according to claim 16, characterized by the fact that the quantity of coupling agents introduced into the amorphous silica ranges between 5 and 15% by weight compared to the weight of the amorphous silica.

18. Process according to any of the claims 1 to 17, characterized by the fact that the bitumen is chosen from among the natural bitumens, the pyrobitumens, the artificial bitumens or their mixes.

19. Process according to claim 18, characterized by the fact that the bitumen is chosen from asphalt or maltha.

20. Process according to any of the claims 18 or 19, characterized by the fact that the bitumen chosen is asphalt.

21. Product to be obtained by a process according to any of the claims 1 to 20.

22. Use of the product according to claim 21 for the fabrication of mortar or coatings.

23. Use of the product according to claim 21 for the fabrication of pavement for roads.